OPERATING SUMMARY

LAKE TIMISKAMING (HAILEYBURY)

1972

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JAN 8 1974
MINISTRY OF THE ENVIRONMENT

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Ontario

Ministry of the
Environment

135 St. Clair Avenue West
Toronto 195, Ontario

We are pleased to present you with the 1972 operating summary for the water pollution control plant and water supply system serving your community.

This summary contains data on the performance of the plants as well as relevant financial information. Of particular interest is the review of the year's activities in which significant items of these data are discussed in some detail by the operations engineer and his staff who, through their day-to-day involvement with the operation, are thoroughly familiar with the plants.

We appreciate your continuing interest in protecting both the environment through efficient operation of the wastewater treatment facility and the well-being of the community through the provision of an adequate supply of safe potable water.

D.S. Caverly,
Assistant Deputy Minister.

D.A. McTavish, P. Eng.,
Director,
Project Operations Branch.

MINISTRY OF THE ENVIRONMENT

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C.W. Perry

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P.J. Osmond

OPERATIONS ENGINEER
J. Wesno

135 St. Clair Avenue West
Toronto 195

LAKE TIMISKAMING

(HAILEYBURY)

WATER TREATMENT PLANT

and

WATER POLLUTION CONTROL PLANT

MINISTRY OF THE ENVIRONMENT

1972 ANNUAL OPERATING SUMMARY

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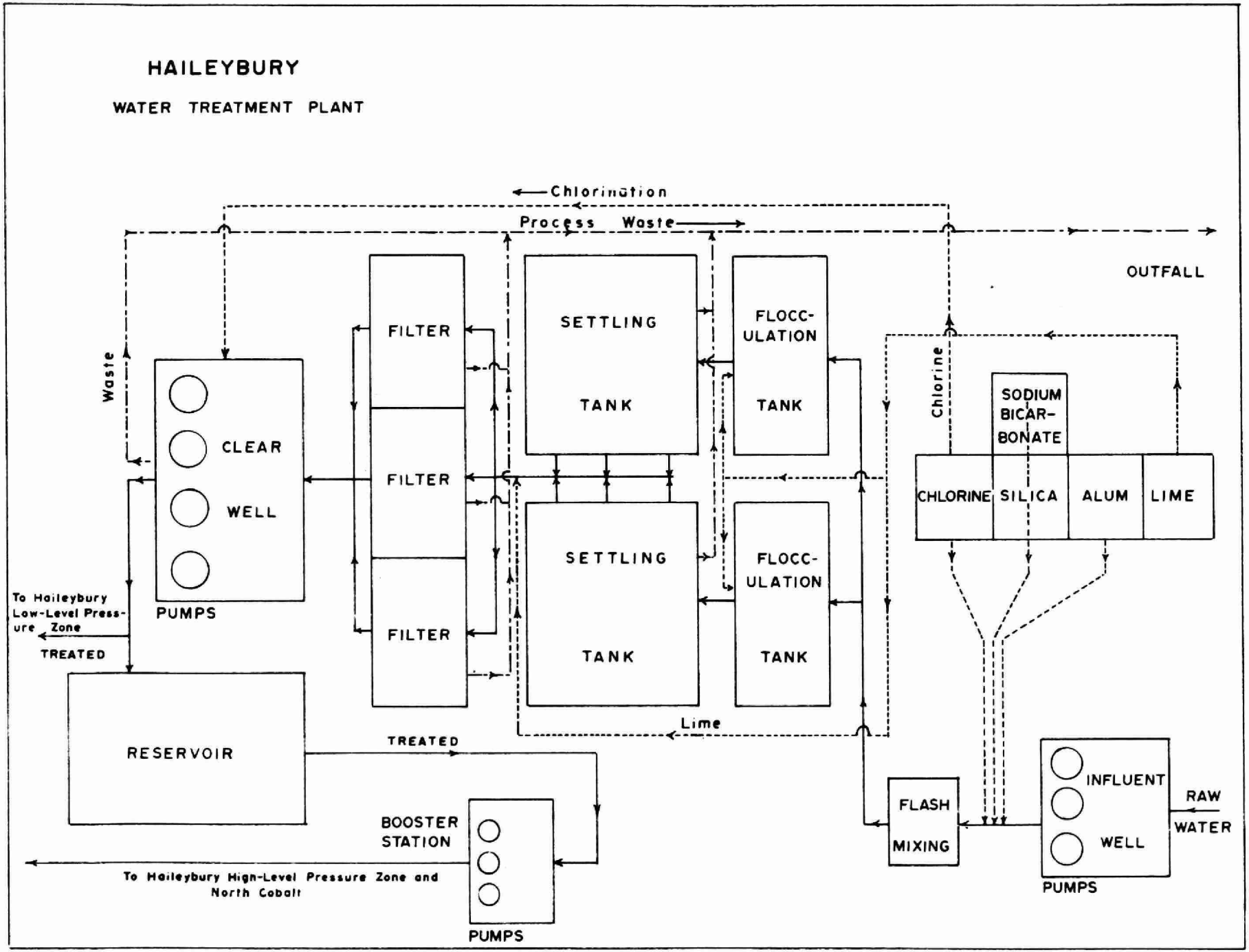
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WATER TREATMENT PLANT

HAILEYBURY

WATER TREATMENT PLANT



DESIGN DATA

LAKE TIMISKAMING

NOMINAL CAPACITY 1.5 MIGD
RAW WATER SOURCE Lake Timiskaming

INTAKE

910' of 18" dia plastic gravity intake
Design flow 5 MGD

LOW LIFT PUMPING
- 3 submersible pumps
Capacity: 600 GPM ea.

WATER TREATMENT PLANT

FLASH MIXING
Capacity 520 gal

FLOCCULATION TANKS
Size: 15' x 24.5' x 9' (21,000 gal)
Detention: 40 minutes

SETTLING TANKS
Size: 55' x 23'-4" x 9' (154,000gal. tot.)
Overflow rate: 550 gpd/sq.ft.

FILTERS
Type: Gravity Anthracite & Sand
Size: Three 10' x 14'
Filter rate: 2.4 gpm/sq.ft.

CLEAR WELL
Capacity: 55,000 gal.

HIGH LIFT PUMPING
Type: PLEUGER Deep Well Submersible
Capacity: Three 580 IGPM @ 230' TDH
(2.4 MIGD total)

BACKWASH PUMP
Type: PLEUGER
Capacity: 2600 gpm @ 26' TDH

STANDBY POWER
60 cps 3-phase STAMFORD alternator
with 6 cyl. DORMAN diesel

STORAGE
Reservoir 0.4 MG
Old Reservoir: 0.2 M.G.

BOOSTER STATION
Pump Type CRANE vertical turbine
Capacity: Two 700 gpm
One 1350 gpm
Standby power: BEDFORD horizontal Diesel
to #3 pump (1350 gpm)

'72 Review

GENERAL

The Lake Timiskaming Water Treatment Plant is a 1.5 MGD complete treatment plant and is designed to provide for an ultimate capacity of 3.0 MGD.

This plant provides complete treatment to a very soft, aggressive, and highly coloured raw water. The process is designed to reduce the aggressive nature of this water and to bring the colour, turbidity, and iron concentrations to within Ministry water quality levels. Chlorination is also provided to disinfect the water supply.

The treated water is pumped directly to a 0.4 M.G. capacity ground storage reservoir. Water is fed by gravity from this reservoir to the lower sections of the old Town of Haileybury South (formerly North Cobalt). Areas in the old Town located at higher elevations than the reservoir are serviced by continuously operating high lift booster pumps located at the reservoir.

The plant is staffed by a superintendent, a maintenance operator and three operators who divide their duties between the Haileybury Water and sewerage projects.

The original construction works did not provide for a feedermain from the treatment plant direct to the storage reservoir. As a result, pressure difficulties developed in the old mains and numerous breaks occurred throughout the system. This problem was corrected with the installation of a direct feedermain late in the year.

Numerous construction deficiencies hampered the operation of the plant which resulted in water quality problems from time to time during the year. Most of these deficiencies were corrected by the contractor. The major outstanding deficiency was the water plant roof construction. The entire roof is to be replaced in 1973 at no cost to the project.

EXPENDITURES

The total operating cost for the project was $48,790.40. The largest expenditures for the year were Salaries at $20,484.66 and Power at $14,740.84. The cost per thousand gallons treated is approximately 33¢.

PLANT FLOWS

The total plant output for the year was 174.3 million gallons. The average daily flow was .470 million gallons. A maximum daily flow of .870 million gallons occurred in March. The average daily flow represented 31.3 percent of the plant design capacity of 1.50 MGD, while the maximum daily flow represents approximately 60 percent of design.

PROCESS CHEMICALS

A total of 15,200 gallons of alum was used as a coagulant during 1972. The average dosage was 57 mg/l with the dosage ranging from 26 to 118 mg/l.

A total of 394.9 gallons of sodium silicate at an average dosage of 3.2 mg/l and 723 pounds of sodium bicarbonate and 363 lbs. of ammonium sulphate both at an average dosage of 0.55 mg/l were used to produce activated silica which was used as a coagulant aid.

A total of 35,200 pounds of lime at an average dosage of 20 mg/l was added to control the pH in the filter and clear well areas.

A total of 3,101 pounds of chlorine at an average dosage of 1.8 mg/l was used to maintain a residual of 0.5 mg/l for the required 15 minute period.

WATER QUALITY

The raw water hardness is in the "soft" range at an average of 35 mg/l as $CaCO_3$. The treated water hardness averaged 53 mg/l and is also considered to be in the "soft" range.

The treated water average iron content of 0.13 mg/l Fe is well within the recommended limit of 0.30 mg/l.

The treated water turbidity at an average of 3 JTU and the treated water colour average at 7 apparent units does not meet the Ministry's standards of 1 JTU and 5 apparent units respectively. Part of the reason for this is attributed to construction deficiencies and it is anticipated that the 1973 results will be within Ministry limits.

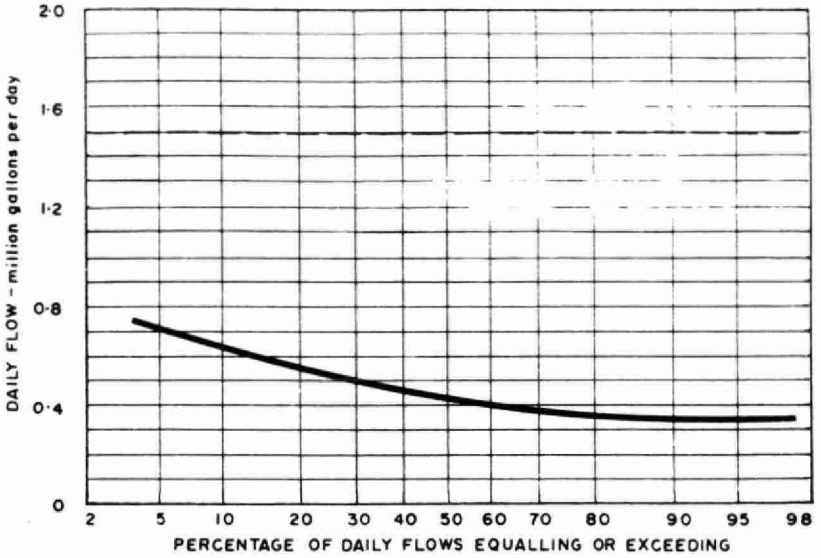
Bacteriological samples collected from the treated water at the plant and the distribution system were all coliform free.

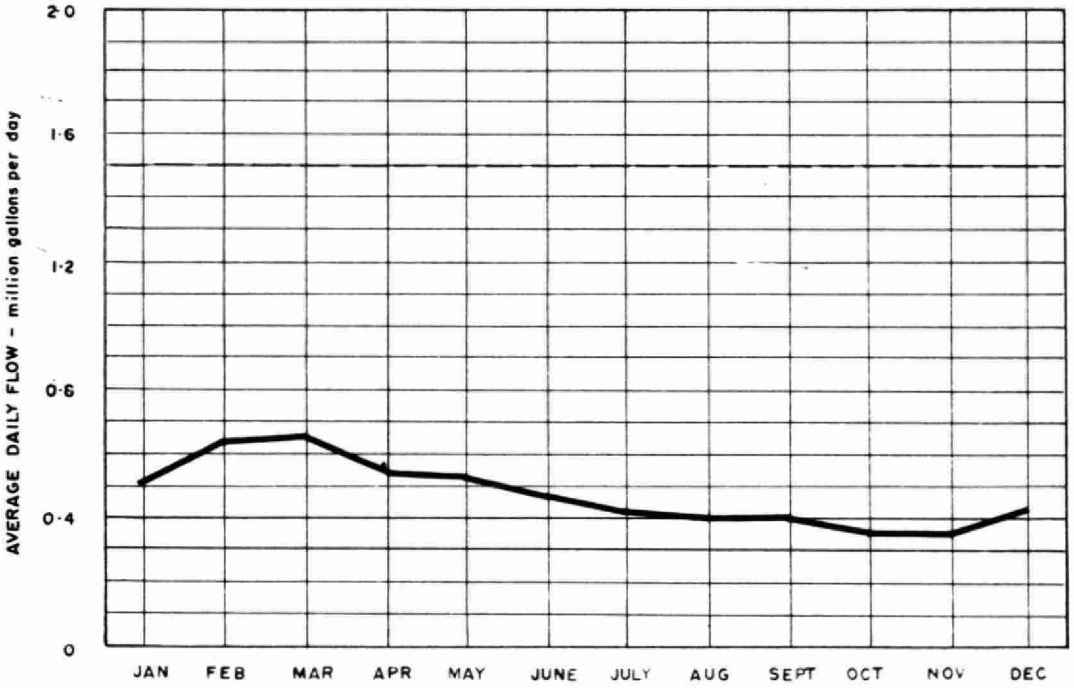
CONCLUSIONS

The plant produced an acceptable effluent for potable purposes when it is considered that there were numerous construction deficiencies which hampered the operation in this, its first year.

It is anticipated that the quality of the treated water with respect to colour and turbidity will be considerably better in 1974.

FLOWS





DESIGN CAPACITY _ _ _ _ _ _ _ _

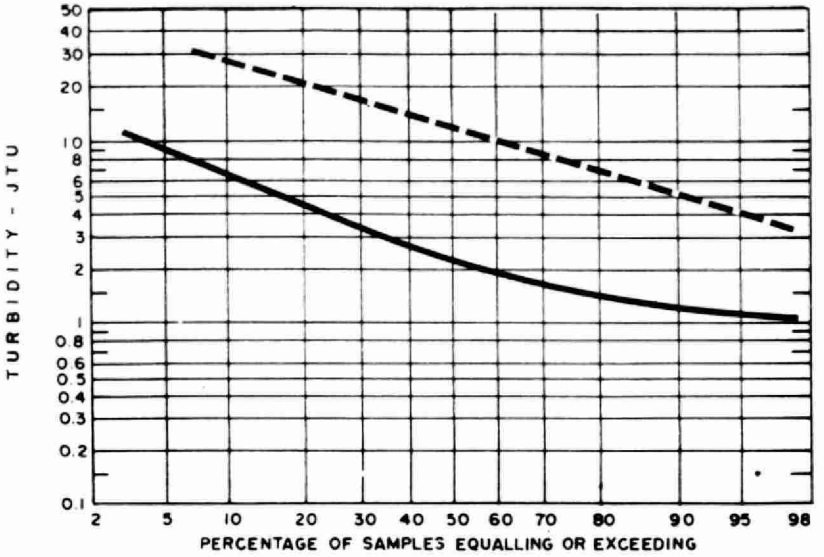
PLANT PERFORMANCE

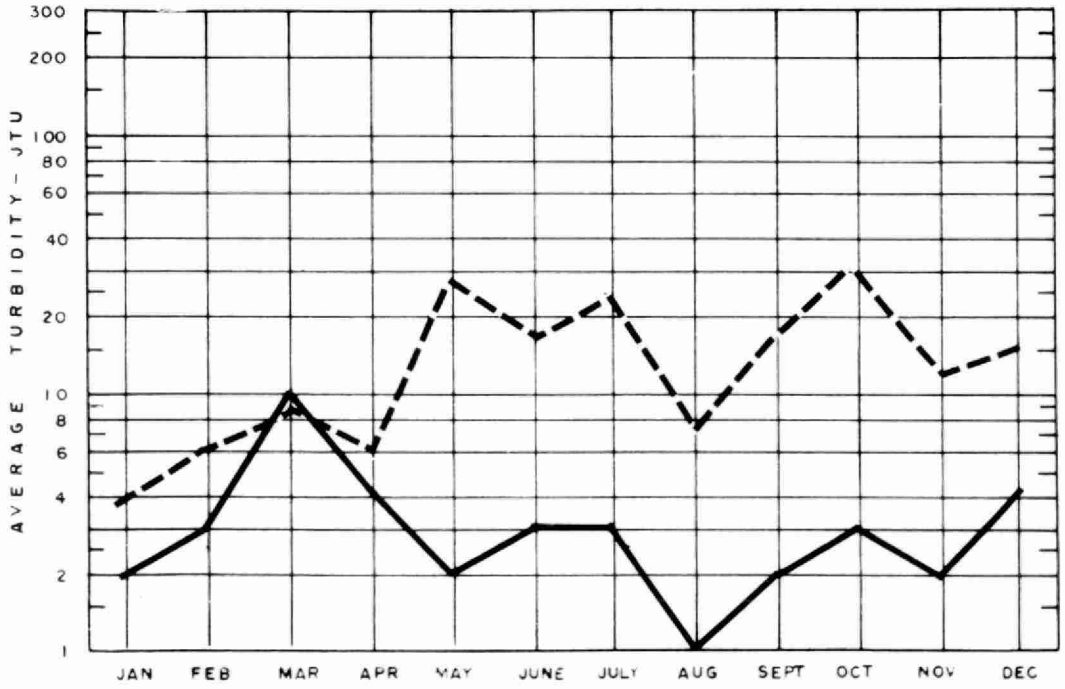
MONTH	FLOWS				RAW WATER		TREATED WATER					
							TURBIDITY		COLOUR		TEMPERATURE	
	TOTAL PLANT OUTPUT million gallons	AVERAGE DAILY FLOW million gallons	MAXIMUM DAY'S FLOW million gallons	MAXIMUM RATE mgd	TURBIDITY (AVERAGE) JTU	COLOUR (AVERAGE) App. units	AVERAGE JTU	MAXIMUM JTU	AVERAGE App. units	MAXIMUM App. units	AVERAGE °F	MAXIMUM °F
JAN	15.7	.51	.80		4	58	2	2	5	5		
FEB	18.5	.64	.78		6	55	3	3	5	5		
MAR	20.4	.66	.87		9	60	10	12	13	20		
APR	16.4	.55	.63		6	40	4	6	5	5		
MAY	16.3	.53	.73		28	65	2	3	7	10		
JUNE	14.5	.48	.70		15	75	3	6	8	15		
JULY	13.2	.42	.55		23	50	3	4	8	10	62	63
AUG	12.3	.40	.60		7	50	1	5	5	5	62	64
SEPT	12.0	.40	.78		17	50	2	2	5	5		
OCT	11.3	.36	.39		30	85	3	3	10	10	50	58
NOV	10.9	.36	.40		12	98	2	2	5	5	41	44
DEC	12.8	.41	.50		15	85	4	4	7	10	35	38
TOTAL	174.3											
AVG.		.47	MAXIMUM .87	MAXIMUM	14	64	3	MAXIMUM 12	11	MAXIMUM 20	50	MAXIMUM 64

CHLORINATION and DISINFECTION

MONTH	RAW WATER					PLANT EFFLUENT		DISTRIBUTION SYSTEM		CHLORINATION			
	NUMBER OF SAMPLES HAVING TOTAL COLIFORM ORGANISMS PER 100 ml OF					NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	TOTAL AMOUNT OF CHLORINE USED pounds	DOSAGE		RESIDUAL IN PLANT EFFLUENT mg/l
	0	1 - 3	4 - 32	33 - 320	> 320						PRE - mg/l	POST - mg/l	
JAN	2	0	0	0	0	0	0	2	0	220		1.4	.5
FEB	2	0	0	0	0	0	0	2	0	263		1.4	.5
MAR	2	0	0	0	0	0	0	2	0	381		1.9	.5
APR	2	0	0	0	0	0	0	2	0	371		2.3	.5
MAY	2	0	0	0	0	0	0	2	0	262		1.6	.5
JUNE	2	0	0	0	0	0	0	2	0	313		2.2	.6
JULY	1	0	0	0	0	0	0	1	1	275		2.1	.6
AUG	0	0	0	0	0	0	0	0	0	239		1.8	.5
SEPT	0	0	0	0	0	0	0	0	0	216		1.8	.5
OCT	0	0	0	0	0	1	0	1	0	194		1.7	.5
NOV	0	0	0	0	0	2	0	2	0	167		1.5	.5
DEC	0	0	0	0	0	1	0	1	0	200		1.6	.6
TOTAL	13	0	0	0	0	4	0	17	1	3101			
AVG.	0 (NOTE - Average shown is the GEOMETRIC MEAN)									8 pounds per day		1.8	.5

TURBIDITY





PLANT INFLUENT

PLANT EFFLUENT

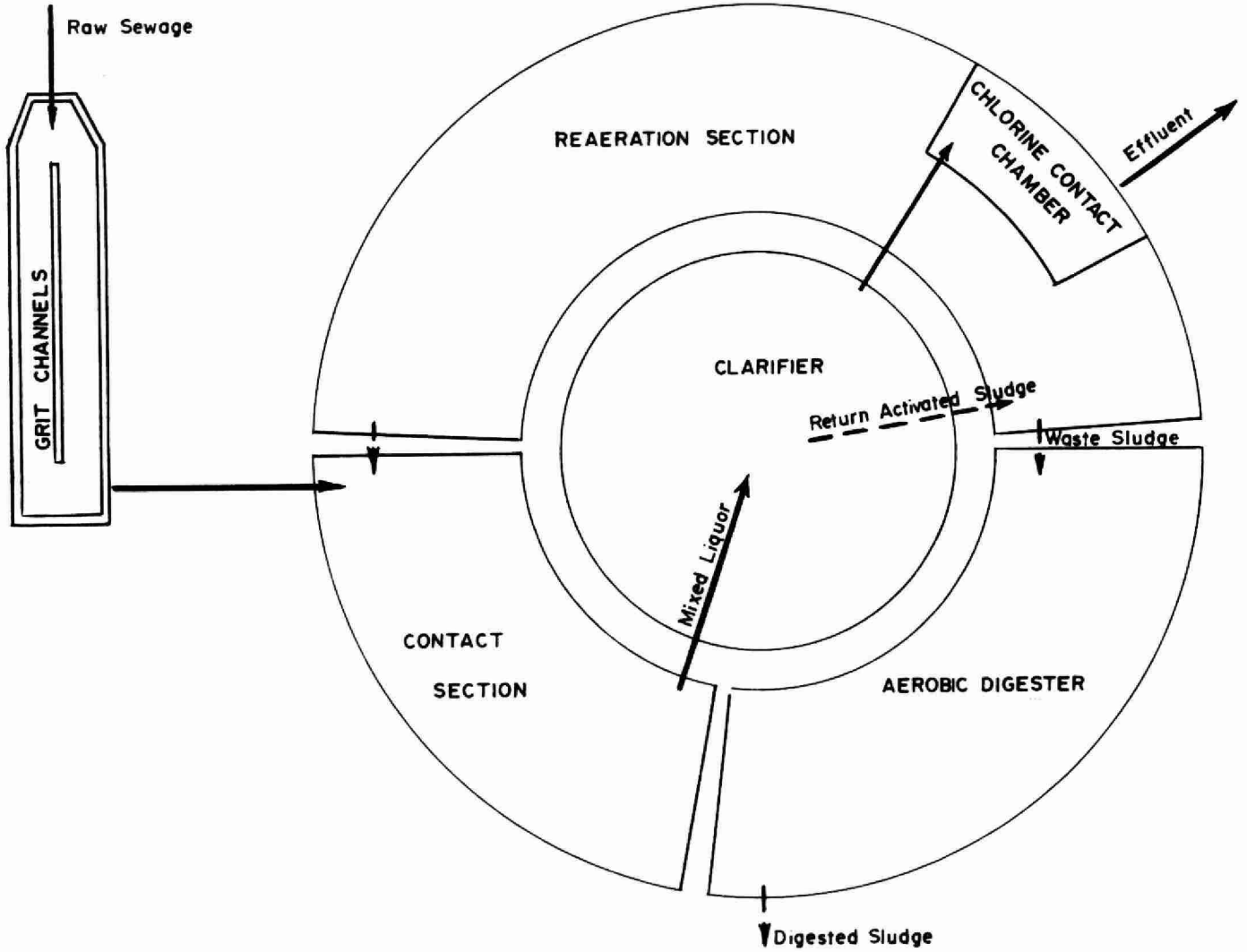
WATER QUALITY

PROPERTY	RAW WATER				TREATED WATER				DESIRABLE STANDARDS
	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	
HARDNESS in mg/l as $CaCO_3$	27	35	92	20	27	53	84	24	80 – 100
ALKALINITY in mg/l as $CaCO_3$	27	20	46	9	27	21	32	< 1	30 – 100
IRON in mg/l Fe	27	1.3	2.9	.4	27	.13	.25	<.05	Less than 0.3
CHLORIDE in mg/l Cl^-	27	3	3	1	27	4	5	2	Less than 250
pH in pH units	27	7.7	9.2	7.0	27	8.0	9.6	4.9	7.0 – 8.5
FLUORIDE in mg/l F^-	2	.2	.2	.1	3	.1	.2	.1	Less than 1.2

TREATMENT DATA

MONTH	FILTER OPN		CHEMICALS USED					
			ALUM		SODIUM SILICATE SOLN		LIME	
	AVERAGE RUN hours	BACKWASH WATER million gallons	AMT. USED 10^3 gallons	DOSE mg/l.	AMT. USED gallons	DOSE mg/l	AMT. USED 10^3 pounds	DOSE mg/l
JAN	86	.39	2.9	118	37.5	3.3	6.0	38
FEB	75	.36	1.5	53	26.3	2.7	4.4	24
MAR	76	.39	1.3	42	40.8	2.8		
APR	77	.39	1.4	55	37.5	3.2	6.0	37
MAY	78	.30	1.8	71	38.8	3.3	6.2	38
JUNE	60	.26	1.9	84	30.0	2.9	4.2	29
JULY	69	.23	.9	46	31.0	3.3	3.1	24
AUG	62	.26	.8	43	31.0	3.5		
SEPT	89	.23	.5	26	30.0	3.5	1.2	10
OCT	108	.15	.7	43	31.0	3.8	1.2	10
NOV	85	.16	.7	43	30.0	3.8	1.2	11
DEC	56	.22	.8	42	31.0	3.4	1.7	13
TOTAL		3.34	15.2		394.9		35.2	
AVG.	77	.28	1.3	57	32.9	3.2		20

WATER POLLUTION CONTROL PLANT



HAILEYBURY WPCP

DESIGN DATA

PROJECT NO.	1-0069-67
DESIGN FLOW	0.350 mgd
BOD - Raw Sewage	170 mg/l
- Removal	90%
SS - Raw Sewage	200 mg/l
- Removal	90%

PUMPING STATION

Two - 625 IGPM @ 61 ft TDH
One Diesel engine

GRIT REMOVAL

Type: Manually cleaned channels
Size: Two

SCREENING

Bar Screen 1 3/4" openings

AERATION

Volume: 8,300 ft^3 or 52,400 gal
Detention: 3.6 hr @ 0.35 mgd
Diffusers: S & L Aluminum

REAERATION SECTION

Volume: 21,330 ft^3 or 132,900 gal
Detention: 7.6 hr @ max. return rate of 417,600 lgpd

AEROBIC DIGESTER

Volume: 15,000 ft^3 or 93,400 gal
Loading: 4.3 ft^3/capita

SEDIMENTATION

Volume: 12,100 ft^3 or 75,500 gal
Detention: 5.7 hr @ 350,000 lgpd
Loading: Surface weir

CHLORINE CONTACT CHAMBER

Volume: 8600 gal
Detention: 35 min @ 0.35 mg

'72 Review

GENERAL

The Haileybury project consists of a 350,000 gallon per day prefabricated contact stabilization treatment plant, screening and grit removal facilities, and a custom built pumping station. The plant is operated jointly with the Haileybury Water Treatment Plant and the Haileybury South Sewage project by a staff of five members.

The plant produced an excellent quality effluent despite the fact that it was hydraulically overloaded by 17%. The final effluent BOD averaged 8 mg/l and the suspended solids 10 mg/l.

A collector system's survey has been tentatively planned by the Ministry of the Environment's, Sanitary Engineering Branch for 1973 to determine if the hydraulic overloading to the plant can be alleviated. If not, it will be necessary to commence work on a plant expansion prior to the schedule date of 1977.

PLANT FLOWS and CHLORINATION

The average daily flow of 410,000 gallons was 117 percent of the design flow capacity. This represented an increase of 20,000 gallons per day over 1971 and 60,000 gallons per day over 1970.

A total of 2,281 lbs. of chlorine was required at an average dosage of 3.1 mg/l to produce a final effluent residual of 0.5 mg/l. Chlorination was carried out only between the months of April and November.

PLANT EFFICIENCY

The average raw sewage BOD and suspended solids concentrations were respectively 138 mg/l and 137 mg/l, a substantial decrease from the previous year. This is attributed to the fact that sampling periods which have been extended from eight hours per day to twenty four hours per day, (twice monthly) takes into consideration the low strength raw

sewage from 8.00 p.m. to 8.00 a.m. The average BOD and suspended solids reductions were 94 and 93 percent respectively and the average effluent BOD and suspended solids concentrations were 8 mg/l and 10 mg/l respectively.

The mixed liquor suspended solids concentration averaged 3300 mg/l, approximately 18 percent less than the previous year and the F/M ratio averaged .06.

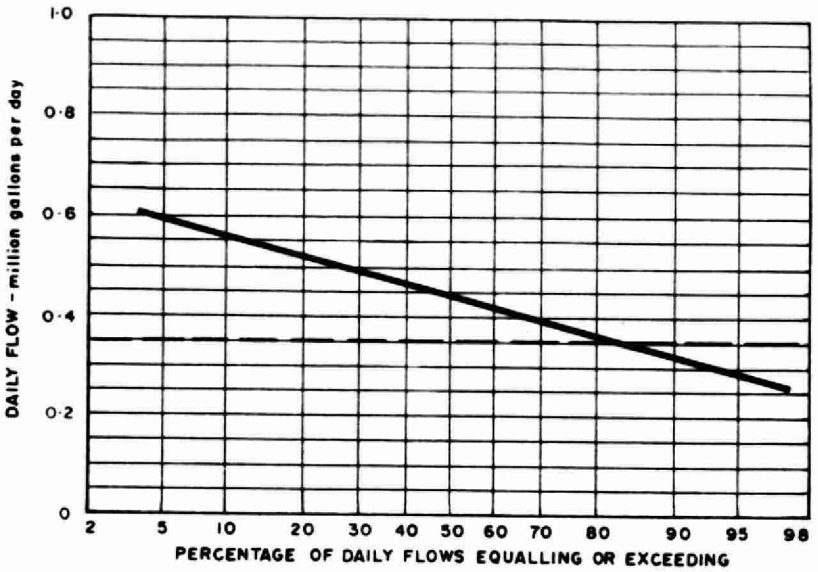
SLUDGE DIGESTION AND DISPOSAL

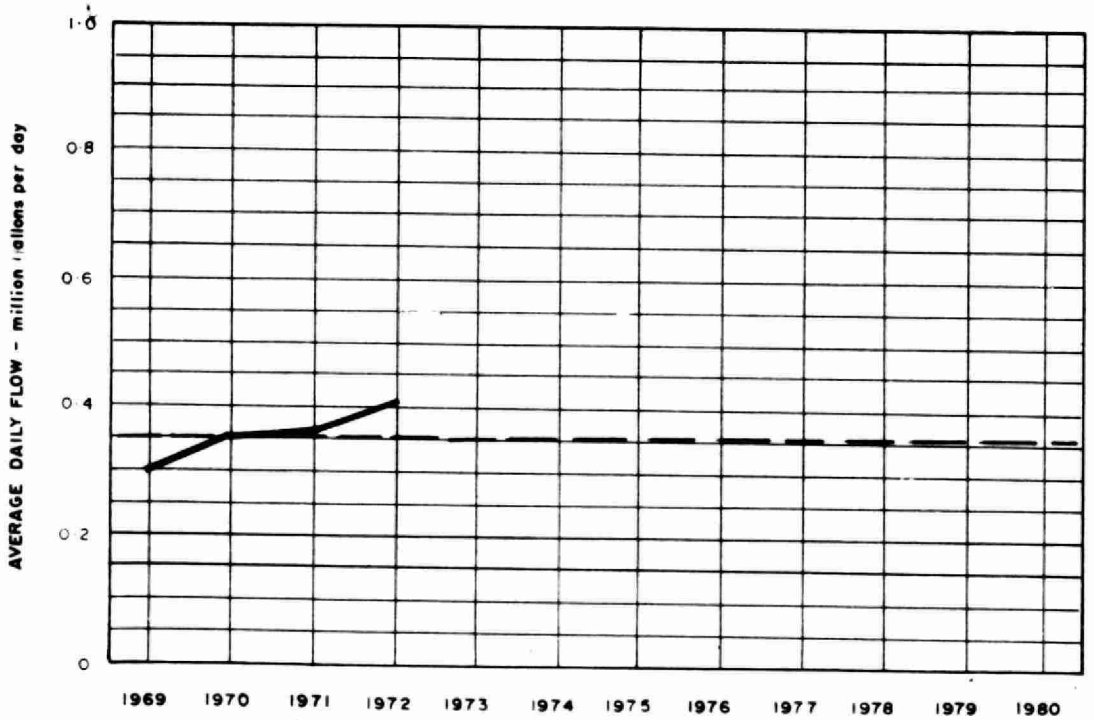
A total of 203,500 gallons of raw and waste activated sludge was pumped to the digester, and a total of 88,000 gallons with an average concentration of 1.3 percent was removed from the digester by tank truck. The volatile solids content of the digested sludge averaged 49 percent which represented excellent digestion.

CONCLUSIONS

The plant produced an excellent quality effluent despite the fact that it was hydraulically overloaded by approximately 17 percent. A survey of the collector system to determine if the hydraulic loading can be reduced is tentatively planned for 1973. A plant expan sion will be initiated in the same year if the overloading conditions cannot be reduced.

FLOWS



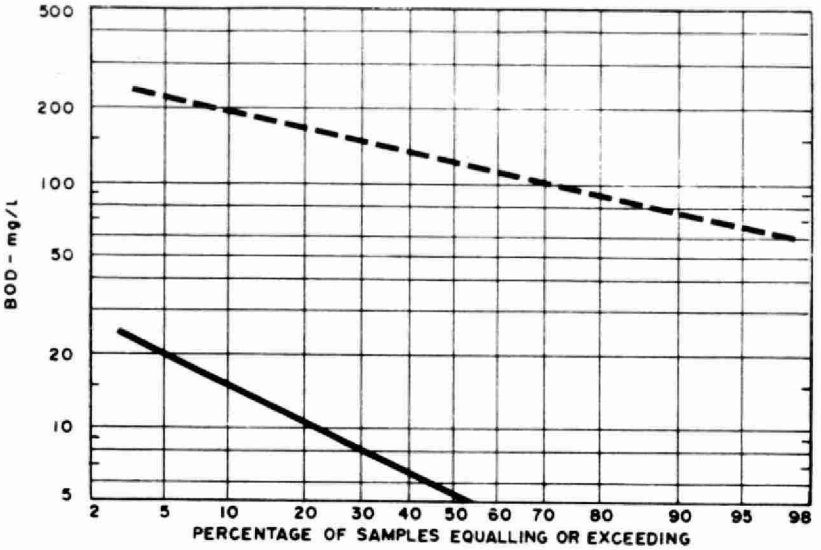


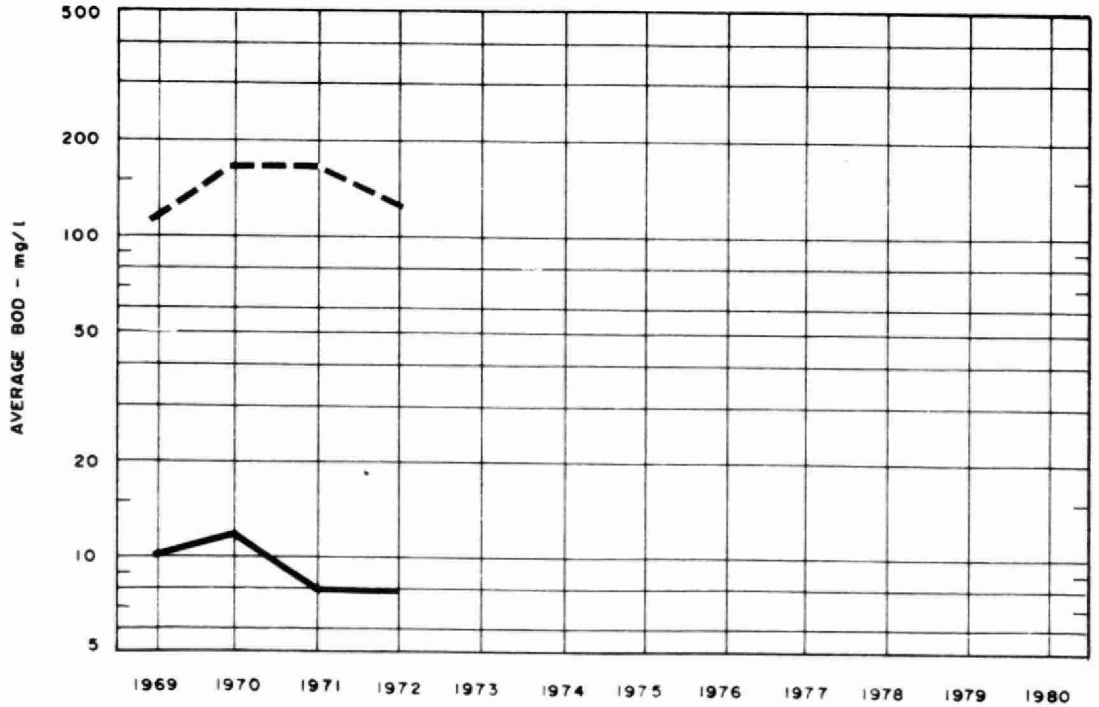
DESIGN CAPACITY _ _ _ _ _ _ _ _

PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10^3 pounds	mg/l	mg/l	%	10^3 pounds	mg/l P	mg/l P
JAN	-	-	-	135	6	95	-	140	10	93	-	6.7	1.7
FEB	11.0	.38	.41	215	7	97	23.0	180	10	94	18.8	15.0	1.1
MAR	11.2	.36	.41	125	9	93	12.9	170	18	89	16.9	8.5	2.3
APR	16.0	.53	.81	95	5	95	14.4	110	11	90	15.9	5.0	.9
MAY	13.0	.42	.53	97	6	94	11.8	100	8	92	12.0	6.1	1.8
JUNE	-	-	-	157	6	96	-	290	10	97	-	9.5	3.3
JULY	-	-	-	155	23	85	-	175	30	83	-	8.3	3.8
AUG	11.0	.36	.55	180	4	98	19.4	140	3	98	15.1	10.0	3.4
SEPT	11.7	.39	.77	140	4	97	15.9	145	5	97	11.1	10.2	3.2
OCT	13.5	.43	.55	75	8	89	9.0	145	8	93	20.9	7.0	2.8
NOV	14.6	.49	.69	155	11	93	21.1	115	3	97	16.4	8.6	3.2
DEC	12.6	.41	.44	110	7	94	13.0	135	3	98	16.6	9.7	3.0
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG.	-	.41	MAXIMUM .81	138	8	94	15.6	137	10	93	12.0	8.7	2.5
No. of Samples	-	-	-	26	26	-	-	26	26	-	-	26	26

BIOCHEMICAL OXYGEN DEMAND

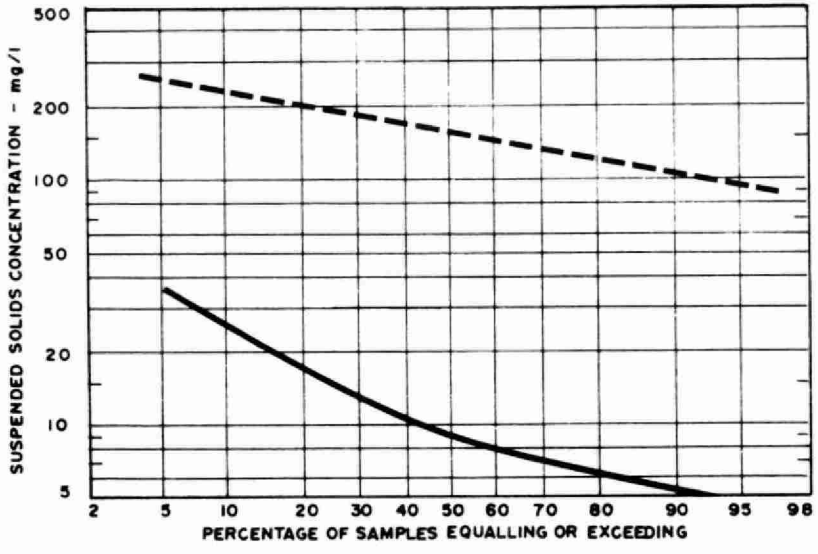


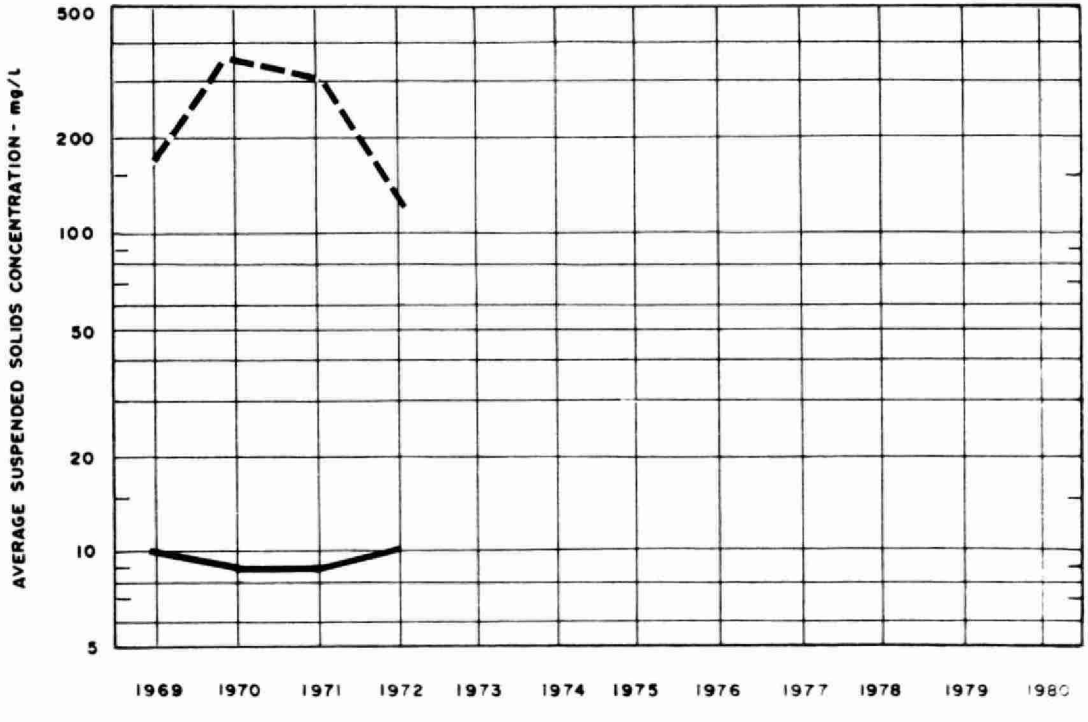


PLANT INFLUENT

PLANT EFFLUENT

SUSPENDED SOLIDS

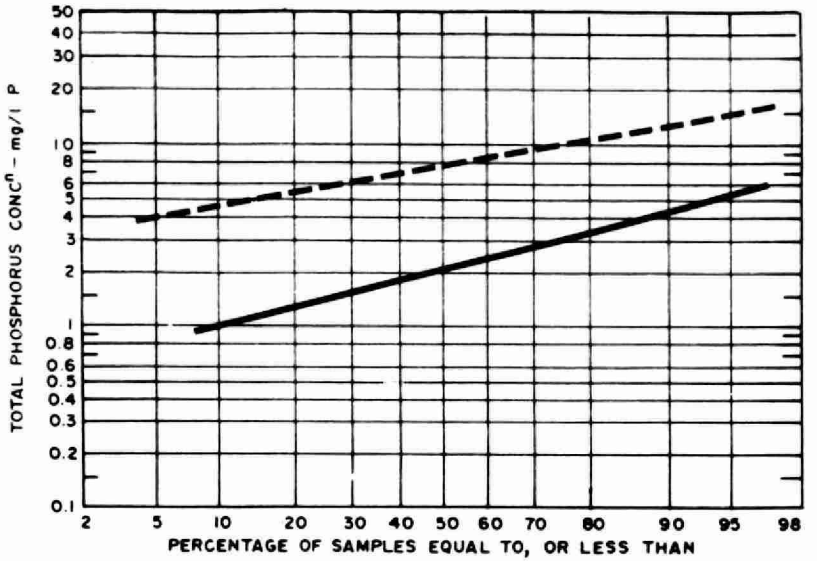


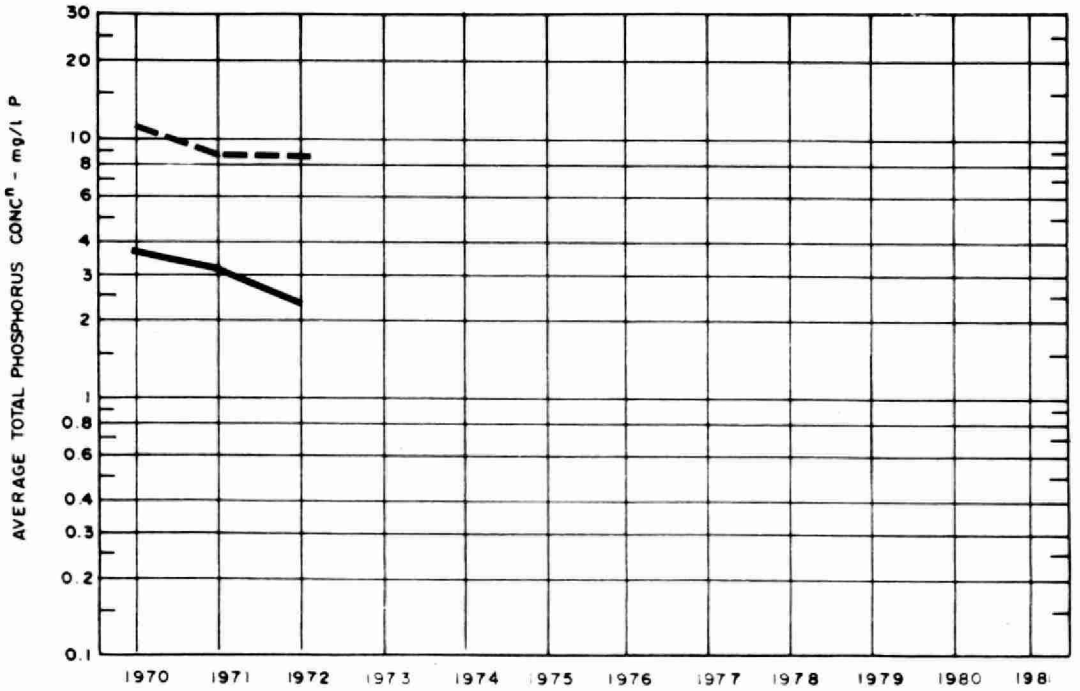


PLANT INFLUENT

PLANT EFFLUENT

PHOSPHORUS





PLANT INFLUENT

PLANT EFFLUENT

TREATMENT DATA

MONTH	GRIT	CHLORINATION		AERATION			WASTE SLUDGE			AEROBIC DIGESTER			
	QUANTITY REMOVED cubic feet	Cl_2 USED 10^3 pounds	AVG. DOSAGE mg/l	MLSS. CONC mg/l	F/M * day^{-1}	AIR USED $\frac{1000\ ft^3}{lb\ BOD}$	QUANTITY 10^3 gallons	SUSPENDED SOLIDS mg/l	VOL. SOLIDS %	QUANTITY REMOVED 10^3 gallons	SUSPENDED SOLIDS mg/l	VOL. SOLIDS %	AMOUNT HAULED cubic yards
JAN	41	-	-	3700	-	-	18.5			0	7400	63	0
FEB	64	-	-	3100	.03	.8	14.5			0	8800	64	0
MAR	97	-	-	3400	.01	1.5	25.0			0	9400	50	0
APR	76	292	3.0	3300	.01	1.3	28.0			0	13500	49	0
MAY	117	450	3.5	3500	.01	2.3	25.0			0	19000	48	0
JUNE	84	289	-	3500	-	-	25.0			48.0	19000	48	285
JULY	75	342	-	3900	-	-	17.5			-	15000	48	0
AUG	109	417	3.8	4200	.01	2.0	18.0			0	20000	23	0
SEPT	89	354	3.0	4000	.01	2.3	24.0			40.0	19000	42	237
OCT.	90	137	2.1	2900	.01	4.3	4.0			0	8400	42	0
NOV	65	-	-	2100	.02	.9	4.0			-	7300	65	0
DEC	80	-	-	2500	.02	1.5	-			-	6500	46	0
TOTAL	987	2281	-	-	-	-	203.5	-	-	88.0	-	-	522
AVG.	6.6 cu. ft/mil gal	380	3.1	3300	.01	1.9	17.0			7.3	13000	49	44

Note: Reaeration tank sludge concentration assumed equal to digested sludge concentration.

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